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TITLE:

BASIC EXPEDITIONARY AIRFIELD RESOURCE (BEAR)

REQUIREMENTS ANALYSIS TOOL (BRAT)

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Executive Summary

Title: Basic Expeditionary Airfield Resources (BEAR) Requirements Analysis Tool (BRAT)

Author: Maj Andrew W. Hunt

Thesis: The analytical community in the Air Force is recognizing the need for high-quality logistics inputs into detailed operational analysis. As such, there is a need for logistics tools used to formulate those inputs.

Discussion: Accurately depicting the expeditionary combat support requirements needed to support aerial operations is integral when validating operational analyses. One-dimensional examination of weapon system performance in various analytic scenarios is no longer sufficient to defend force structure and budgetary decisions. In order for operational analysis to be accepted (especially in the Joint environment), the approach must include detailed inputs on support and sustainability. Tools designed to form the necessary logistics inputs are becoming increasingly sought after. This research paper develops an easy-to-use spreadsheet model that can capture the BEAR required to support various scenarios. BEAR assets are transportation-intensive; accurate representation in analytical time-phased force deployment data (TPFDD) is critical when identifying airlift requirements and subsequent impacts on overall force closure.

Conclusion: This spreadsheet model incorporates the characteristics of the deployed location as well as other components of the scenarios. The result is a specific list of equipment that can be immediately incorporated into a TPFDD and greatly increases the realism and accuracy of the associated model inputs. There are definite areas for future research and further development of the model that should prove relatively simple to accomplish.

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I. Introduction

Logistics must be easy…everyone thinks they're an expert—Anonymous

In operational analysis, it is easy to focus on the glamorous. It is easy to focus on the 1-versus-1 aerial engagements, probability of kills for air-to-air munitions, and other associated "cool" simulations. What is not glamorous, but is arguably just as important, are the logistics inputs that feed the operational analysis. Modeling that 1-versus-1 aerial engagement is undoubtedly important, but the engagement itself is impossible without fuel, runways, munitions, and base operations support (BOS) equipment. One of the dangers in operational analysis is to take out the "magic wand" and assume away the logistics factors in the scenario. No one wants their analysis to grind to a halt because some loggie tells them that they are out of fuel, or that the 100 F-22s they want to beddown at a remote airfield in Saipan will not fit. However, in the resource-constrained environment of today (let alone the future), these types of considerations must be addressed if the operational analysis used to influence budgetary decisions is to maintain any validity or relevance. Increasingly, the analytical community in the Air Force is recognizing the need for high-quality logistics inputs. As such, there is a need for logistics analysis tools used to formulate those inputs. This thesis proposes one possible tool.

Research Question

This paper attempts to answer the question "Can a spreadsheet model be used to determine Basic Expeditionary Airfield Resources (BEAR) requirements in support of non-Operations Plan (OPLAN) scenario analysis?" BEAR requirements for supporting OPLAN needs are well documented. However, the assets required to support those scenarios or vignettes outside the OPLAN structure are less defined. Capturing the total requirement is important not

only for planning and analysis considerations, but also may be important for budgetary reasons. It is important to recognize that operational analysis must not be limited to the actual engagement or employment of combat power, but must consider all aspects of the military operation. In this case, determining the amount of BEAR to include in a force flow affects the transportation system and the ensuing ability to close forces in a timely manner.

Investigative Question #1

In order to develop the spreadsheet model and answer the research question, certain investigative questions must be addressed. The first is, what variables must be considered when determining BEAR requirements?

Investigative Question #2

The second question, which defines the value added of the model, is how can this tool be used for analytical purposes? This tool is not designed for real-time contingency planning, but for use in analysis only.

This research/development effort begins with a literature review focusing on Air Force prepositioning of war reserve materiel (WRM) as well as a look at the BEAR/SSSP projects ongoing in the analytical community. The next section outlines the methodology used to develop the spreadsheet. The analysis and results section outlines the findings, and concludes with a presentation of the finished product. The conclusion section answers the investigative and research questions, and provides areas for possible research.

II. Literature Review

There is a great deal of interest about how the Air Force prepositions and lifts its War Reserve Materiel. A number of studies, War College papers, and professional journal articles have been published over the past decade examining the prepositioning program and offering varied recommendations. In most cases, these writings espouse a common theme that there is insufficient airlift to satisfy the Air Force's movement requirements and that other modes of transportation and staging must be explored.

Perhaps the seminal work on Air Force prepositioning program is the three-part study conducted by the Air Force Logistics Management Agency (AFLMA) that concluded in 2003. In 1999, the USAF/IL (Director for Installations and Logistics) asked the AFLMA to examine potential changes to the afloat prepositioning program. Specifically, the study team was directed to determine if it would it make sense to put non-munitions WRM (items such as vehicles, bare base equipment, etc) afloat. The results of the first part of the study concluded that placing non-munitions WRM afloat was feasible.[1]

The second part of the study was a traditional cost-benefit analysis of putting non-munitions afloat. The AFLMA's analysis determined that the initial costs associated with this option would be approximately $71 million; the majority of this figure represented the buy total of WRM assets required to fill-out current unfunded requirements and the containers needed to store them.[2] The cost to lease the ship was not captured in the initial costs, since (as of 2003) there was a ship already leased but not being used. If the WRM storage requirement dictated the lease of a second vessel, the AFLMA determined that the increase in cost would simply mirror the costs for the first vessel.[3] In the conclusion of this portion of the study, the AFLMA project

team acknowledged that the $71 million start up cost might be seen as prohibitive to senior Air Force leadership.[4]

The final portion of the study focused on a specific implementation plan if the Air Force decided to implement an afloat option based on the previous study recommendations. The AFLMA concluded that putting non-munitions WRM afloat did not negatively affect the Air Force's ability to support an OPLAN; in fact, the study showed that assets strategically positioned afloat met nearly 100 percent of the combatant commander's required delivery dates, given a certain amount of ambiguous warning.[5] As such, the AFLMA recommended implementing the afloat option as funding became available. The AFLMA effort closed in 2003, and to date, there are no plans to follow the agency's recommendations.

The RAND Corporation also conducted a prepositioning study, sponsored by USAF/A4 (formerly USAF/IL). Unlike the AFLMA study, the RAND effort focused on land-based options for staging WRM, centered on the establishment (or robusting) of forward operating locations (FOLs) and forward support locations (FSLs). RAND developed an optimization model that selected locations based on transportation and operating costs. The study concluded that forward positioning of WRM provides planners the ability to minimize transportation costs (specifically strategic airlift costs) while maximizing supportability for deterrence exercises and contingencies.[6]

Col Joseph Diana (USAF) wrote an article titled "Improving Bare Base Agile Combat Support" for the *Air Force Journal of Logistics* in which he compared the results of the AFLMA and RAND studies in an attempt to determine the proper WRM prepositioning strategy. Col Diana rated the recommendations of each study based on a set of criteria, including

responsiveness and readiness, and concluded that the afloat option provided the best agile combat support while stating that "some land-based storage is prudent and necessary."[7]

There are various Naval War College papers that also address afloat prepositioning. In his paper, *Air Force Afloat Prepositioning Fleet*, Col Richard Dugan (USAF) discusses the history of the Air Force prepositioning program, and offers his recommendations. Col Dugan advocates the use of smaller, faster vessels to carry Air Force WRM to points of need, but sees a limitation in the applicability of this concept to high-demand/low-density precision-guided munitions.[8] LCDR Scott McCain's paper, *The Afloat Prepositioning Program: Do Service Mission Differences Preclude Total Jointness?*, examines the feasibility of joint management of all Service afloat prepositioning programs, ultimately concluding that the difference in concepts and execution preclude this type of integration.[9]

Published literature on the development of the Basic Expeditionary Airfield Resources (BEAR) requirements process and the Steady State Security Posture (SSSP) planning document is not as readily available as is the information on prepositioning. Both efforts are ongoing and finished documents (other than working papers) are simply not available. However, as a member of the team that developed the BEAR requirements determination heuristic, the author has access to a number of briefings and correspondence that are valuable to this research effort. Two of the major BEAR documents are PowerPoint slides used to brief the BEAR General Officer's Steering Group in May and November 2007. These briefs were presented by Air Combat Command A4RX to HQ USAF/A4R and A7X. The content of these slides contains the quantitative data and analytical methods used to determine the quantity of BEAR assets needed to meet future requirements.

The SSSP documentation should be finalized and published in the near future. A successor for the Base Security Posture (BSP), the SSSP seeks to capture those small-scale vignettes (e.g., foreign internal defense, humanitarian assistance) and surge events (major combat operations) that may form the future operating environment. One limitation encountered by using these sources is that much of the BEAR/SSSP work is classified SECRET; certain data cannot be published in the MMS environment.

III. Methodology

The methodology for this research paper is predominately qualitative. This chapter consists of two main sections. The first contains background information on BEAR and the SSSP. This section begins with a discussion of the Air Force's BEAR program, to include ongoing Unit Type Code (UTC) modifications, shipping modifications, and prepositiong location updates. Following this discussion is an examination of the BEAR requirements determination project. An introduction to the development of the SSSP concludes the first section of this chapter. The second section presents a notional quantitative approach that will determine the feasibility of using BEAR assets to support non-OPLAN operations (and, specifically, those operations found in the SSSP documentation). This approach considers the following variables: response/warning time, frequency and duration of the operation, destination location (in general terms so as not to violate classification guidelines), and number of Air Force personnel deployed. The result of the analysis is a spreadsheet-based decision support model that can be used for future analytical efforts.

A Brief BEAR Discussion

Contrary to popular belief, the Air Force does not always deploy to locations with five-star hotels in the immediate vicinity. Since the end of World War II, the Air Force has possessed a robust bare base support package, much like the US Army's Force Provider capability. In fact, the Air Force has deployed its bare base equipment in support of numerous operations. During Operation NORTHERN WATCH (1997-2003), the "tent city" at Incirlik AB in Turkey housed as many as 2,000 rotational troops at one time; the tent city at Al Udeid AB, Qatar was even larger. These tent cities were built using Harvest Eagle sets (designed to support 550-person increments) and Harvest Falcon sets (support for 1,100 people). These packages consisted of

tents, laundries, kitchens, and other living necessities. They also contained the flightline work

spaces, aircraft hangars (famously known as "clamshells"), and backshop support facilities.[10]

These assets are considered non-unit specific WRM equipment; units deploying to forward

operating locations did not take their own Harvest packages;

In 2002, the Air Force modified its bare base support program. With the creation of the

Agile Combat Support (ACS) concept of operations (and its deployable subset, Expeditionary

Combat Support—ECS), the Air Force needed to demonstrate its ability to operate anywhere in

the world. This expeditionary mindset resulted in the formation of Air Expeditionary Task Force

Force Modules (AETF FMs). These force modules are designed to deploy sequentially to open,

robust, and sustain austere operating locations.[11] Basic Expeditionary Airfield Resources

(BEAR) became the successor to the Harvest program. While the capabilities remain virtually

identical, the packages were redesigned to be lighter (less airlift intensive), more flexible, and

more durable. Under the new program, capabilities fall into the following categories:[12]

- Swift BEAR 150—capable of supporting 150 personnel for a short duration deployment; limited hygiene facilities; normally used by Contingency Response Groups (CRGs)
- BEAR 550i (initial)—housekeeping assets to support up to 550 personnel
- BEAR 550f (follow-on)—housekeeping assets to support an additional 550 personnel
- BEAR Initial Flightline—provides hangar/workspace for one squadron
- BEAR Follow-on Flightline—provides hangar/workspace for an additional squadron
- BEAR Industrial Operations—provides supply, administration, and other workstations

BEAR assets are currently deployed to various locations in support of Operations IRAQI

FREEDOM, ENDURING FREEDOM, and were used in support of operations in New Orleans

following Hurricane Katrina. BEAR assets are managed by the 49th Materiel Maintenance

Group (MMG) at Holloman AFB, New Mexico, and are prepositioned at the locations shown in
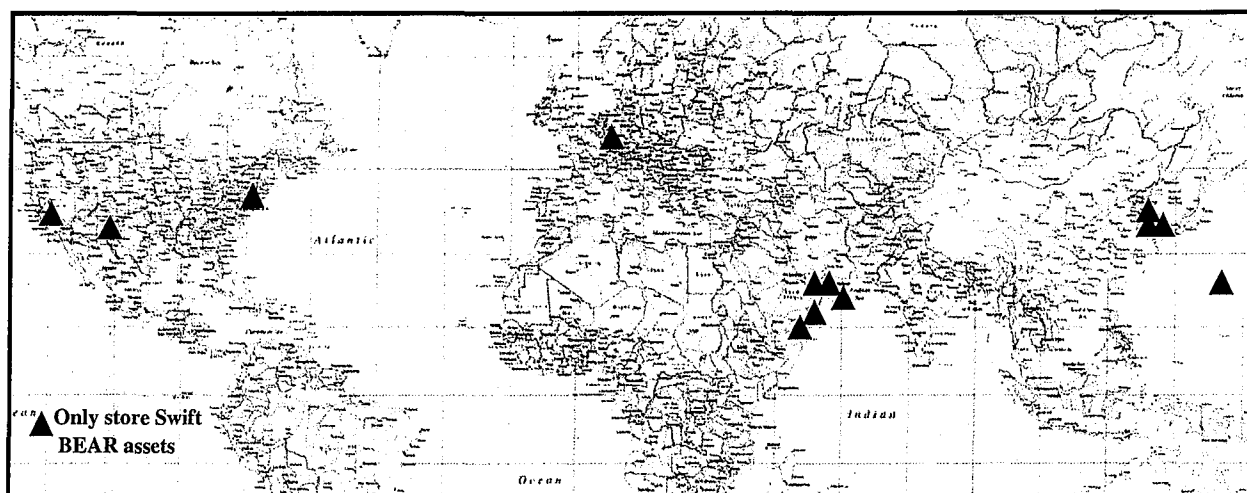
Figure 1.[13]

Figure 1. USAF BEAR Prepositioning Locations

Recent BEAR Updates

In 2007, Air Combat Command (ACC—the Air Force's lead command for BEAR) began

studying changes to the BEAR program. At the time, BEAR capabilities were packaged for air

transport only. And even though the evolution of the program meant that the UTCs were indeed

lighter, they were still very heavy. For example, one XFB1H UTC (a BEAR 550i kit) weighs

231 short tons. This UTC alone would require five C-17s for movement. Airlifting the entire

BEAR package found in the Establish the Base Force Module would require 47 C-17s.[14] In an

environment where all Services are competing for scarce airlift to lift time-sensitive

requirements, this lift bill is significant. As a result, ACC determined that BEAR UTCs must be

able to be transported using a variety of modes, to include ground and sealift. The current BEAR

UTCs are now being repackaged for containerized movement, with a great deal of study being

conducted at Marine Corps Logistics Base, Albany, Georgia.

Being able to transport BEAR assets in a variety of ways was only the first step in reshaping

the program. ACC also determined that changes to the BEAR UTCs themselves were in order.

Currently, the 49th MMG (along with contract support from ICF International) is redesigning the

BEAR UTCs to reflect greater modularity and greater tailorability. As mentioned earlier, the BEAR UTCs on the books (as of 2007) reflect the requirements to support deployments in 550 personnel increments. However, the expeditionary nature of the Air Force today means it is more likely that the Air Force will send fewer airmen to more varied locations. As such, the "old" BEAR 550i kits are no longer right-sized. The current effort to redesign the UTCs is built around a population of 250 personnel. Table 1 shows an example of the equipment required to support a 250-personnel deployment.[15]

- 24 SSS (small shelter system) Tents
- 48 Environmental Control Units
- 1 Shower/Latrine Set
- 1 Kitchen (+,1 Sgl Pallet Expeditionary Kitchen—SPEK)
- 4 Secondary Distribution Centers (power dist.)
- 1 Hi-Power Generator
- 1 Low-Power Generator
- 4 Remote Area Lighting Systems (RALS)
- 1 Water Distribution System
- Various Admin Facilities as required (mortuary, chaplain, etc.)

Table 1. Equipment Requirements to Support 250 Personnel

The UTC transformation project is nearly complete, and should be reflected in the Air Force's UTC library in the near future.

BEAR Requirements Determination Effort and the SSSP

Almost in tandem with the BEAR UTC initiative was the challenge to accurately state the worldwide requirement for BEAR assets. ACC/A4RX (again with contract support from ICF) set out to develop a repeatable requirements determination process that would impact budget decisions for the purchase and reconstitution of BEAR sets. Prior to this endeavor, the requirements determination process for BEAR assets was basically back-of-the-envelope math. This project sought to formalize the procedure and include it in the applicable Air Force

Instruction. ACC asked USAF/A9—Studies and Analyses, Assessments and Lessons Learned—(the author's previous assignment for insights as to where BEAR assets might be needed in the future. USAF/A9 was in a position to assist in this effort since the logistics analysts in the directorate support the Joint Staff in developing future planning scenarios called Multi-Service Force Deployment documents. These scenarios range from humanitarian assistance to major combat operations; A9 Logistics helped develop the Air Force's combat support and combat service support for these scenarios.

USAF/A9 provided a list of more than 160 operating locations found in two of the four strategic environments that make up the SSSP. For the BEAR requirements determination project, A9 decided to use Strategic Environment #4 as the most stressful case (79 vignettes and 2 surge events), and Strategic Environment #5 as the lease stressful case (55 vignettes and 2 surge events).[16] Each vignette and surge event has an associated list of potential operating locations used as planning considerations.

Rather than just provide location names to ACC, the logisticians at A9 "binned" the bases into categories based on capabilities listed in the National Geospatial Agency's Automated Air Facility Information File (AAFIF). These categories range from Main Operating Base to Austere Base. Logisticians from ACC, US Transportation Command, USAF/A9, ICF, and RAND spent a week determining the type and quantity of BEAR assets required at each location, given the type of operation and deployed population specified in the SSSP. While the results of the project are not yet finalized, the process has proved repeatable.

Decision Matrix Process: Variable Identification

There are four primary variables that can affect the determination of whether or not to deploy and employ BEAR assets: 1) Destination Location Type, or Base Type, 2) Number Personnel Supported, 3) Warning or Notification Time, and 4) Duration and Frequency of the operation. This section will describe each of these variables.

Destination Location Type

The variable that has arguably the most significant affect on the decision whether or not to use BEAR assets is Destination Location Type. This variable characterizes the destination base based on the level of infrastructure currently present. Infrastructure, in this case, includes available billeting, water supply, power and electricity, fuel storage, and force protection/security. The more robust the base, the less likely the need for BEAR assets. The categories of locations under this construct are Main Operating Base (MOB), Cooperative Security Location (CSL), Collocated Operating Base (COB), Forward Operating Site (FOS), and Austere. Table 2 provides the detail on each base type as they relate to infrastructure. This table was built with information from the SSSP/BEAR Requirements Determination study.[17]

Base Type	US Presence	Airfield Type	Billeting	Power	Water	Covered Storage	A/C MX	POL	Crash, Fire, Rescue	Road/Rail
MOB	High	Military	On Base or Bivouac	Avail	Avail	Avail	Avail	Avail	Avail	Yes
COB	Low	For. Mil/Joint	On Base or Bivouac	Avail	Avail, Limited	Avail, Limited	Avail	Known, Unknown	Avail, Limited	Yes
FOS	High/Low	For. Mil/Joint/ Civ	On Base, Bivouac, None	Avail, Limited, Unknown	Avail, Limited, Unknown	Avail, Limited, Unknown	Avail, Limited, None	Avail, Bladders	Avail, Limited, None	Yes/No
CSL	High/Low	For. Mil/Joint/ Civ	On Base, Bivouac, None	Avail, Limited, Unknown	Avail, Limited, Unknown	Avail, Limited, Unknown	Avail, Limited, None	Avail	Avail, Limited, None	Yes/No
Austere	Low	Military/Civ	Bivouac, None	None	Limited, Unknown, None	Avail, Limited, Unknown	Limited, None	Unknown, None	Limited, Unknown	Yes/No

Table 2. Destination Location Type

Number Personnel Supported

Along with Destination Location Type, the number of personnel deployed in support of an operation will greatly affect the decision on whether or not to send BEAR assets. Based on the new BEAR construct mentioned earlier, category bins for this variable are based on 250 personnel increments, until the population exceeds 1,000. Table 3 shows the population bins used in the matrix.

Bin	# Personnel
1	1-250
2	251-500
3	501-750
4	751-1,000
5	>1,000

Table 3. Personnel Bins

Warning or Notification Time

This variable directly relates to the transportation methods available to transport BEAR, as well as the ability to locally procure similar capabilities. For example, if the warning time falls in the 0 to 72 hour bin, there probably is not time to establish local contracts for base operating support needs. Additionally, if the warning time falls in this bin, overland or sea movement of BEAR assets is unfeasible, meaning that air transport is the only viable means of moving this equipment. Warning Time also may affect the decision on whether or not to establish local contracts to meet BOS needs rather than deploying in BEAR assets. Table 4 shows the time bins used in the matrix.

Bin	Warning Time
1	0-72 Hrs
2	3-14 Days
3	>14 Days

Table 4. Warning Time Bins

Duration and Frequency of Operation

Duration and Frequency of Operation pertains to how long an operation is projected to last, as well as how many times in the programmable future (the SSSP incorporated a seven-year planning horizon based on the 2008-2014 fiscal year development plan) an operation is predicted to occur. Operations that are short in duration and happen infrequently are better candidates for BEAR deployments than are operations that are longer in duration and occur frequently at the same locations. The underlying question as it relates to this variable is, "At what point does construction of permanent facilities become feasible, *or* at what point does contracting out the base operating support functions make more sense?" The bins used for this category are somewhat artificial, as the exact durations and frequencies are impossible to determine. However, they are consistent with the analysis used in developing the SSSP.

Assumptions used in Analysis

There were a number of assumptions considered when developing the decision support matrix. These assumptions either address operational factors applied across all scenarios or address a lack of available unclassified information. The assumptions are:

- Cost per flying hour data provided by US Transportation Command's Single Mobility System is accurate and accepted.

- C-17 equivalents are determined by dividing the cumulative short tons of the UTC by the planning allowable cabin load (ACL) of 45 short tons; dimensional data is not discussed.

- Destination locations have a servicing maximum-on-ground (MOG) of two C-17s.

- BEAR UTCs that provide industrial operations, flightline operations, or airfield operations are not included.

- Minimum notification required for transporting BEAR assets via sealift is based on sailing times from pre-determined locations plus a standard three-day onload, three-day offload timeframe. For surface movement, the notification time is based on miles divided by a constant speed. Road networks are not addressed.

- BEAR setup time is constant, and is not location specific.

- Operation type (humanitarian assistance, show of force, etc.) do not affect need for BEAR.

- Excess billeting capacity estimations are based on either first-hand experience or as a result of examining multiple airbases of different types. The estimates are:

  o MOBs: capacity to house 500 inbound personnel

  o COBs: capacity to house 250-300 inbound personnel

  o CSLs: capacity to house less than 250 inbound personnel

  o FOS: capacity to house less than 100 inbound personnel

  o Austere: no excess billeting exists

IV. Analysis and Results

This section presents the analysis conducted and the results determined using the previously discussed methodology. The first portion of this section will present a general overview of the setup of the analysis, as well as identify key findings or shortfalls in the initial approach. The second portion will expand on the logic used and results of the spreadsheet model. The final section will describe the actual finished product tool that was developed as a result of this research effort.

General Overview and Findings

There were a total of 300 different combinations of the defined variables examined; each destination location type accounted for 60 instances. In each location's "bin" each variable remained constant except for the duration of the deployment. Figure 2 shows an example of the MOB bin. For each of the population bins, there is a similar depiction.

Destination Type	Region	Population Size	Warning Time	Duration	Frequency	BEAR	Package
MOB		<250	0-72	0-14	1	No	None
MOB		<250	3-14 days	0-14	1	No	None
MOB		<250	>14 days	0-14	1	No	None
MOB		<250	0-72	15-30	1	No	None
MOB		<250	3-14 days	15-30	1	No	None
MOB		<250	>14 days	15-30	1	No	None
MOB		<250	0-72	30-120	1	No	None
MOB		<250	3-14 days	30-120	1	No	None
MOB		<250	>14 days	30-120	1	No	None
MOB		<250	0-72	Continuous	1	No	None
MOB		<250	3-14 days	Continuous	1	No	None
MOB		<250	>14 days	Continuous	1	No	None

Figure 2. MOB bin, <250 Personnel

There were a number of findings that emerged after the spreadsheet build and logic determination were complete. One finding was that of the variables examined, frequency proved too difficult to incorporate given the static nature of this spreadsheet. If planners can project multiple deployments to the same location over the course of the planning horizon, at some point

one might expect a degree of permanence to emerge. However, in preparations for the first deployment to a location, provisions will most likely be made to at least provide initial base operating support capability using organic assets (depending on destination location type). This spreadsheet is designed to only examine the initial deployment. Future efforts may warrant including a category that captures whether or not this is the first deployment to a candidate base.

A second finding was that any distance related variables do not necessarily affect the need for BEAR assets at a deployed location. These variables, such as distance between origin and destination, certainly influence the mode of transportations that can get the assets to the deployed location in a timely manner, and were used by RAND and AFLMA in the studies to determine optimal prepositioning locations. These considerations are outside the scope of this effort. Additionally, warning time as it relates to transportation impacts was disregarded. Warning time as it related to local contracting ability, however, was included.

Logic and Results

There was no black box quantitative formula used to determine the need for organic BEAR assets at a location. As this tool is meant to assist in developing the Time-Phased Force Deployment Data (TPFDD) used in logistics analysis, a repeatable, qualitative approach is sufficiently comprehensive. To illustrate this approach, each base type-population-duration combination will be discussed.

For Main Operating Bases, determining the requirement for BEAR is relatively straight forward. As MOBs are well-established permanent locations with excess capacity, the need for augmented base operations support equipment is triggered when the inbound personnel exceeds the ability of the MOB to bed them down. Recall that the assumption was that each MOB had

the ability to house 500 inbound personnel. In this case, when the inbound force flow exceeds 500, some type of BEAR package is required. Only when the warning time exceeds 14 days, and the deployment duration is continuous is this not the case. The reason for this exception is the assumption that 14 days provides sufficient lead time to establish local contracts as MOBs are normally located in areas where civilian resources are readily available.

On the other end of the spectrum, determining the need for BEAR assets at an austere location is equally straight forward. Under each combination of variables, at least some BEAR package is required to support operations. Again, this directly relates to the operational factors surrounding this destination type. Per Air Force Instruction 10-400, the definition of an Austere location is one that has a runway and a source of water that can be made potable. Other than that, there is probably not much there, to include the ability to contract out requirements. Therefore, the inbound population alone drives the BEAR requirement.

For the bases in the middle of the support spectrum, the determination of the requirement becomes a bit more difficult. Collocated Operating Bases are usually military or joint use airfields and have robust infrastructures. Cooperative Security Locations that are civil airfields tend to be relatively capable civilian fields (such as international airports). Forward Support Locations are normally small military or civilian fields, and may have some issues with power and water availability and fuel storage. Given these distinctions, the BEAR requirements for FOS locations resemble the requirement for austere locations; however, with more than 14 days of warning time for a continuous deployment, there is no requirement for BEAR. For CSLs and COBs, BEAR is required when the inbound force flow exceeds the excess billeting capacity at those locations. COBs and CSLs tend to be in locations that have somewhat capable local

economies, so contracting capability exists if warning time and duration show local purchasing to be an option.

Spreadsheet Model

As mentioned earlier, this spreadsheet model provides logistics analysts with a quick-look planning tool that can be used to provide TPFDD inputs in support of operational analysis scenario development. The tool is designed to accept user inputs on *base name, deploying personnel, warning time,* and *duration* and provide a BEAR UTC list along with other planning considerations (C-17 equivalents). For example, if the scenario calls for a 500-person deployment to Butterworth Airfield in Malaysia, the user would select "BUTTERWORTH" from the "Base Name" dropdown menu. The "Base Type" automatically populates based on the base name. One limitation of the tool is that not every base in the AAFIF database is included in the model, as there are more than 65,000 locations. Even so, there are more than 160 airfields included in the model and adding airfields is not difficult. The user then provides inputs for the "# Personnel," "Warning Time," and "Duration" fields. This results in a Required UTC list. The list includes: the UTC (in ZZZZZ format), the UTC Title, the level two detail (the associated short tons), and the C-17 equivalents (short tons divided by the standard allowable cabin load of 45 short tons). In a future version of the tool, clicking on the UTC Title will bring up the mission capability statement. Screen captures of the spreadsheet are available in Appendix A.

V. Conclusions and Recommendations

The spreadsheet model developed as a result of this research paper provides Air Force logistics analysts with a quick-look tool that can be used to create better, more accurate analytic TPFDDs. While this model only addresses BEAR requirements, the methodology could also be applied to other non-unit specific WRM assets such as vehicles and other items. It must be stressed that this model is not designed for real world operational use, but for analytical use only. This section of the paper will address the research and investigative questions, and will provide areas for possible future research or areas for study

Research Question

Simply, a basic spreadsheet model can be used to determine BEAR requirements in support of non-OPLAN scenarios or vignettes. The model combines airfield data from AAFIF with qualitative reasoning to determine the BEAR UTCs needed to support specific quantities of deploying personnel to a variety of operating locations.

Investigative Questions

The first investigative question involved determining which variables affected the need for BEAR at a location. Destination type (MOB, COB, FOS, CSL, Austere), warning time, and deployment duration were identified as variables that had an impact. Originally, originating location and other transportation related variables were identified as other influencing factors but were discounted. These variables may identify movement or availability constraints, but did not necessarily reflect the need for BEAR. The frequency of the deployment over the stated planning horizon may impact the need for BEAR; however, the nature of the variable made it too difficult to capture in this basic model. The second investigative question addressed the possible use of this tool for analytical purposes. Logistics analysts at USAF/A9 have expressed interest in

this tool for quick-turn use at TPFDD development conferences. The better the TPFDD coming out of the conferences, the less refining is required when the scenario is subject to operational analysis. This tool is also useful for those analysts not familiar with the BEAR concept, and takes a great deal of guesswork out of the equation when it comes to base operations support.

Areas for Future Research

As mentioned earlier, the frequency of the deployment is a variable that will influence the need for BEAR. Expansion of the model to take a more dynamic look at the deployment of assets over time may be worthwhile. Since this model only examines the requirement for BEAR assets, future effort to include different UTCs, both personnel and equipment, may be warranted. Using this type of spreadsheet model to conduct a time-distance-cost analysis of deploying BEAR assets may also prove useful, though much of that work is already in progress.

Summary

The 1-versus-1 engagement simulations pitting the latest fighter jets against each other will continue to be the subject of beautiful PowerPoint slides. Without sound logistics analyses underpinning those simulations, the slides remain hollow. As a result, logistics inputs to operational analysis continue to face increasing scrutiny and vigorous challenges. Tools that provide analysts with the ability to infuse research with relevant and accurate data are inherently valuable. Spreadsheet models such as the one developed as a result of this research go a long way to giving the loggie the ability to definitively say "we can support that."

Notes

[1] Capt. Paul E. Boley II, "Cost Benefit Analysis of Afloat Prepositioning of Non-Munitions War Reserve Materiel," AFLMA Final Report LX200001300, October, 2001, ii.

[2] Boley, 55.

[3] Capt. Todd Groothuis, "Afloat Prepositioning of Non-Munitions War Reserve Materiel—Phase II," AFLMA Final Report LX200125700, April 2003, 20.

[4] Boley, 55.

[5] Groothuis, 24.

[6] Mayhar Amouzegar and others, *Analysis of Combat Support Basing Options* (Santa Monica, CA: Rand, 2004), xxi.

[7] Col Joseph Diana, "Improving Bare Base Agile Combat Support." *Air Force Journal of Logistics Vol 28, no. 2* (Summer 2004): 15.

[8] Col Richard A. Dugan, "Air Force Afloat Prepositioning Fleet," (Research Project, US Army War College, 2000), 12.

[9] LCDR Scott McCain, "The Afloat Prepositioning Program: Do Service Mission Differences Preclude Total Jointness?," (Master's Thesis, Naval War College, 2003), 16.

[10] "Basic Expeditionary Airfield Resources," http://www.globalsecurity.org/military/systems/aircraft/systems/bear.htm

[11] The Air Expeditionary Force Force Module concept is a product of the Agile Combat Support Concept of Operations. Under this construct, there are six tailorable modules designed to present forces to the geographic combatant commanders. The six modules are: Open the Base, Command and Control, Establish the Base, Operate the Base, Generate the Mission, and Augmentation. BEAR assets are deployed in support of the Establish the Base module.

[12] US Air Force, AFI 25-101 War Reserve Materiel (WRM) Program Guidance and Procedures May 2005, 55.

[13] Anthony Dronkers, "BEAR Global Strategy: The Air Force Enterprise Capability," 5 Nov 2007, slide 29.

[14] Based on the total weight of XFB UTCs divided by 45 short tons. A more detailed analysis of UTCs would provide a more accurate airlift total since the UTCs are not packaged in 45 short ton increments.

[15] Maj Matt Staples, "Force Modules and Bare Base Concept Implementation," 5 Nov 2007, slide 6.

[16] These timelines are found in a classified brief prepared and presented by the Office of the Secretary of Defense, Policy, Analysis, and Evaluation division.

[17] Anthony Dronkers, "BEAR Requirements Determination," presented to the AF General Officer's Steering Group, Mar 2007, slide 10.

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McCain, Scott. <u>The Afloat Prepositioning Program: Do Service Mission Differences
Preclude Total Jointness?: US Naval War College.</u> Newport RI: US Naval War
College, 2003.

US Air Force. <u>AFI 25-101: War Reserve Materiel (WRM) Program Guidance and
Procedures.</u> 2005.

Appendix A

BEAR Requirements Analysis Tool
Screenshots

The main BRAT input/output screen

The three red circles highlight the main areas of the screen. The top left circle shows the user input cells, to include the base name dropdown cell where the user selects the deployment location. The large circle shows the output format. The final circle shows the C-17 equivalents required to move solely the BEAR requirements.

Airfield Bin Sheet

Airfield Name	Afld Cat	Country	Level US Presence	Airfield Type	On Base Billeting	Power	Water / Sewage	Covered Storage	AC Maint Facilities	Acft Fuel Storage	All Ws Ops?	24 Hr Ops?	Fire Crash Rescue	Road / Rail Access
ABUJA INTERNATIONAL	CSL	Nigeria	Low	Civilian	No	Available	Available	Limited	Available	597,000	IFR	Yes	Available	Yes
ADEN INTERNATIONAL	COB	Yemen	Low	Joint	Bivouac	Available	Available	Available	Available	657,400	IFR	Yes	Available	Yes
AGADES MANU DAYAK	CSL	Niger	Low	Civilian	Bivouac	Limited	Limited	Limited	None	33,000	IFR	Yes	Unknown	Yes
AGANA	CSL	Guam	Low	Civilian	No	Available	Available	None	Limited	1,260,000	IFR	Yes	Available	Yes
AHMED AL JABER AB	FOS	Kuwait	Low	Military	Yes	Available	Unknown	Limited	Available	BLADDER	IFR	Yes	Unknown	Yes
AKROTIRI	COB	Cyprus	Low	Military	Yes	Available	Available	Available	Available	8,841,096	IFR	Yes	Available	Yes
AL DHAFRA AB	MOB	UAE	High	Military	Yes	Available	Available	Available	Available	5,782,972	IFR	Yes	Available	Yes
AL ASAD	FOS	Iraq	High	Military	Yes	Unknown	Unknown	Unknown	Limited	4,150,000	VFR	Yes	Limited	Yes
ALI AL SALEM	MOB	Kuwait	High	Military	Yes	Available	Available	Available	Available	1,366,000	IFR	Yes	Available	Yes
AL-SAHRA	CSL	Iraq	Low	Military	Yes	Limited	Unknown	None	None	Bladder	VFR	Unknown	Limited	Yes
AL UDEID AB	MOB	Qatar	High	Military	Yes	Available	Available	Available	Available	16,995,386	IFR	Yes	Available	Yes
AMILCAR CABRAL INTERNATION	CSL	Cape Verde	Low	Civilian	Yes	Limited	Unknown	Limited	Limited	749,819	IFR	Yes	Limited	Yes
ANDERSEN AB	MOB	Guam	High	Military	Yes	Available	Available	Available	Available	64,665,000	IFR	Yes	Available	Yes
ASCENSION ISLAND	MOB	United Kingdom	High	Military	Yes	Available	Available	Available	Available	2,600,000	IFR	Yes	Available	Yes
ASHGABAT	CSL	Turkmenistan	Low	Civilian	No	Limited	Limited	Limited	Available	3,109,596	IFR	Yes	Available	Yes
ATAR	CSL	Mauritania	Low	Civilian	No	Limited	Limited	None	None	413,000	VRF	Yes	Unknown	Yes
AVIANO AB	MOB	Italy	High	Military	Yes	Available	Available	Available	Available	1,119,300	IFR	Yes	Available	Yes
BAGHDAD	FOS	Iraq	High	Joint	Offbase	Available	Available	Available	Available	300,000	VFR	Yes	Limited	Yes
BAGRAM AB	FOS	Afghanistan	High	Military	Yes	Limited	Limited	Available	Limited	5,930,600	VFR	Yes	Available	Yes
BAKU (HEYDAR ALIYEV)	CSL	Azerbaijan	Low	Civilian	No	Available	Available	Limited	Limited	UNK	IFR	Yes	Available	Yes
BALAD AB	FOS	Iraq	High	Military	Yes	Unknown	Limited	Available	Available	1,105,000	Daylight	No	Limited	Yes
BAMAKO	CSL	Mali	Low	Joint	Bivouac	Limited	Limited	Available	Limited	237,780	IFR	Yes	Available	Yes
BANGKOK INTL	COB	Thailand	Low	Joint	Yes	Available	Available	Available	Available	21,318,000	IFR	Yes	Available	Yes
BASRAH	FOS	Iraq	High	Joint	Yes	Unknown	Unknown	Available	Available	840,000	VFR	Yes	Available	Yes
BATUMI	CSL	Georgia	Low	Civilian	No	Unknown	Unknown	Limited	None	2,506,485	VFR	Unknown	Limited	Yes
BEIRUT RAFIC INTERNATIONAL	CSL	Lebanon	Low	Civilian	No	Limited	Available	None	Available	UNK	IFR	Yes	Available	Yes
BERBERA	Austere	Somalia	Low	Civilian	No	Unknown	None	Limited	None	UNK	Daylight	No	Unknown	No
BOLE INTERNATIONAL	CSL	Ethiopia	Low	Civilian	No	Available	Limited	Limited	None	1,175,000	IFR	Yes	Available	Yes
BOLU	Austere	Turkey	Low	Military	No	Limited	Unknown	None	None	UNK	Daylight	No	Unknown	No
BUCURESTI HENRI COANDA	CSL	Romania	Low	Joint	No	Available	Unknown	Available	Limited	UNK	IFR	Yes	Available	No
BULAWAYO JM NKOMO	CSL	Zimbabwe	Low	Civilian	No	Limited	Unknown	Available	Available	65,000	IFR	Yes	Limited	Yes
BUTTERWORTH	COB	Malaysia	Low	Military	Bivouac	Available	Available	Limited	Limited	443,000	IFR	Yes	Available	Yes
CAIRO	FOS	Egypt	Low	Civilian	Yes	Available	Available	Available	Available	22,161,000	IFR	Yes	Available	Yes
CAIRO WEST	COB	Egypt	Low	Military	Yes	Available	Limited	Limited	Available	373,200	IFR	Yes	Available	Yes
CHAKLALA	COB	Pakistan	Low	Joint	Yes	Available	Limited	Available	Available	130,000	IFR	Yes	Available	Yes
CHEBELLEY	CSL	Djibouti	Low	Military	Bivouac	None	None	None	None	UNK	Daylight	No	Unknown	No
CHIANG MAI INTL	CSL	Thailand	Low	Joint	No	Available	Limited	Limited	Limited	747,000	IFR	Yes	Available	Yes

CoverSheet | DetermineBearReqmnts | AFLD_BINS | BEAR UTCs REQUIRED | BEAR UTC LVL 2 DATA | MASTER | Lists | SavedAssessments

Count: 164